REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-27 are currently pending, with Claims 10-19 being withdrawn as directed to non-elected inventions. Claims 1 and 27 have been amended by the present amendment. The changes to the claims are supported by the originally filed specification and do not add new matter.

In the outstanding Office Action, Claims 1-3 and 20-27 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,566,787 to Tsukahara et al. (hereinafter "the '787 patent") in view of Japanese Patent Application JP 2002-026688 to Nakaso (hereinafter "the '688 patent"); Claims 4-7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the '787 and '688 patents in view of U.S. Patent No. 6,029,500 to Tom (hereinafter "the '500 patent"); and Claims 8 and 9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the '787 and '688 patents in view of U.S. Patent No. 6,060,692 to Bartley et al. (hereinafter "the '692 patent").

Regarding the '688 patent, Applicants note that the Office Action on page 2 refers to this reference as "Nobutaka." However, Applicants respectfully submit that this name is incorrect, and that the correct name is Nakaso, since the first named inventor on the '688 patent is Noritaka Nakaso, who is also one of the inventors of the present application.

Amended Claim 1 is directed to a sensor head, comprising: (1) a three-dimensional base body having a curved surface allowing definition of a circular orbital band; (2) an interdigital electroacoustic transducer being connected to an active switching unit disposed outside of the sensor head, and arranged on the orbital band of the three-dimensional base body, and configured to excite a surface acoustic wave to perform multiple roundtrips along the orbital band; and (3) a gas-sensitive film at least a part of which is formed on at least a

part of the orbital band of the three-dimensional base body, and configured to react with a specific gas molecule so as to develop a change in a propagation characteristic of the surface acoustic wave, wherein the active switching unit is actively controlled such that the active switching unit is configured to switch respective signal paths at desired switching timings between an external high frequency generator and an external detection/output unit so that the active switching unit is configured to transfer a high frequency electric signal from the external high frequency generator to the interdigital transducer, and the active switching unit is configured to switch the signal path from the interdigital transducer to the external detection/output unit, at a timing after the interdigital transducer has transmitted the surface acoustic wave, but just before the surface acoustic wave returns from a predetermined number of a plurality of roundtrips, and the interdigital transducer is configured to convert the surface acoustic wave orbiting along the orbital band into a high frequency output electric signal, wherein the sensor head is actively controlled to output the high frequency output signal, from which a delay time of the surface acoustic wave after the predetermined number of the plurality of roundtrips is calculated by the external detection/output unit, the delay time being generated by so as to detect the change in the propagation characteristic. The changes to Claim 1 are supported by the originally filed specification and do not add new matter.[1]

Applicants respectfully traverse the assertion in the Office Action on pages 4, 8, and 9 that some of the limitations recited in Claim 1 are "intended use" limitations. In this regard, it appears that, as best understood, the Office Action is interpreting various words that denote timing to be "intended use" limitations. On the contrary, Applicants note that Claim 1 clearly uses "configured to" language, which denotes structural properties of the various elements of the sensor head recited in Claim 1. That some of the elements recited in Claim 1 are

[1] See, e.g., Figures 2A-4B and the discussion related thereto in the specification.

structurally configured to operate according to particular timing should not be a reason to interpret those limitations as intended use limitations, or non-structural limitations.

For example, Claim 1 clarifies that the active switching unit is configured to switch the signal path from the interdigital transducer to the external detection/output unit at a timing after the interdigital transducer has transmitted the surface acoustic wave, but just before the surface acoustic wave returns from a predetermined number of a plurality of roundtrips. Thus, Claim 1 clarifies that the active switching unit is configured to switch the signal path at a particular time, which is a definition of how the active switching unit is structurally configured. Applicants respectfully submit that having a device structurally configured with a timing element that controls the device to perform various operations or functions at various times is not in any way related to intended use, since the timing element is a structural part of the device. In the instant case, Claim 1 clearly states how the active switching unit is configured structurally by the recitation of "configured to" language.

In the general case, it is unclear to Applicants how the Office would allow any Applicants to claim a device that is structurally designed to perform certain functions according to a time schedule, under the interpretation set forth in the Office Action. Under the Examiner's rationale, no apparatus could be structurally configured to perform functions at different times, because all of those functions would be interpreted as "intended use" limitations.

For the reasons stated above, Applicants respectfully traverse the assertion in the outstanding Office Action that the limitations of the active switching unit that involve timing, or any other limitation, are "intended use" limitations. On the contrary, Applicants respectfully submit that such limitations structurally limit the active switching unit recited in Claim 1.

Regarding the rejection of Claim 1 under 35 U.S.C. §103(a), the Office Action asserts that the '787 patent discloses everything in Claim 1 with the exception of a gas sensitive film and a switching unit, and relies on the '688 patent to remedy those deficiencies.

The '787 patent is directed to an elastic surface-wave device that includes a substrate having a surface, wherein the surface includes a circularly continuous band on a spherical shape; a surface acoustic wave generator that is provided on the surface of the substrate at the circularly continuous band and generates surface acoustic waves on the surface. Further, the '787 patent discloses that the spherical shape is related to the surface acoustic wave so that the surface acoustic wave propagates within the circularly continuous band in a first direction without diffusing over the circularly continuous band in a second direction other than the first direction.

However, the Office Action admits that the '787 patent fails to disclose a gas-sensitive film at least a part of which is formed on at least a part of the orbital band of a three-dimensional base body, and configured to react with a specific gas molecule so as to develop a change in a propagation characteristic of the surface acoustic wave, as recited in amended Claim 1.

Further, Applicants respectfully submit, and the Office Action appears to admit, that the '787 patent fails to disclose an electroacoustic transducer connected to an active switching unit disposed outside of the sensor head, wherein the active switching unit is actively controlled such that the active switching unit is configured to switch respective signal paths at desired switching timings between an external high frequency generator that transfers a high frequency electric signal to the interdigital transducer and an external detection/output unit, as recited in amended Claim 1. Applicants respectfully submit that the '787 patent is silent regarding a sensor head having an electroacoustic transducer connected to an active switching unit, as recited in amended Claim 1.

Further, Applicants respectfully submit that the '787 patent fails to disclose that the sensor head is actively controlled to output the high frequency output signal, from which a delay time of the surface acoustic wave after the predetermined number of the plurality of roundtrips is calculated by the external detection/output unit, the delay time being generated by the change in the propagation characteristic, as recited in amended Claim 1.

The '688 patent is directed to a spherical surface acoustic device. In particular, as shown in Figure 5A, the '688 patent discloses a circulator 41, which is a passive electronic component with three or more ports, wherein the ports can be accessed when a signal is fed into any port and is transferred to the next port. Further, as shown in Figure 5C, the '688 patent discloses that the circulator 41 serves as a directional coupler that merely separates signals based on the direction of signal propagation at any timing, so that a surface acoustic wave is passively detected every time that the surface acoustic wave orbits along the circular orbital band.

Regarding the '688 patent, Applicants respectfully submit that the translation of the '688 application provided by the Office is not completely accurate. In particular, Applicants have provided below a more appropriate translation of paragraph [0053] of the '688 patent:

> [0053] Then, after electrodes are extracted from two locations, liquid-pipe fittings are connected to a penetrating hole, which is dug in the thick plate made of glass, and to sandwich the penetrating hole in between so as to implement the liquid-detection sensor 40 as shown in Fig. 4 (d). The configuration of the adopted comb-shaped interdigitated electrode is the same as the topology explained in the first embodiment. Against the fabricated liquid-detection sensor 40, when circuitry as shown in Fig. 5 (a) is connected, the input and output of signals to and from the liquid-detection sensor 40 can be established. In the figure, pulsed signals are generated in an impulse signal generator 44, and through a circulator 41, the pulsed signals are fed into the liquid-detection sensor 40. From the circulator 41, the signals generated in the liquid-detection sensor 40 are transferred to an oscilloscope 43 through an amplifier 42, and the output signals are displayed as a signal waveform. When a pulsed signal (200V) of a short time period as shown in Fig. 4 (b) is applied to the liquid-detection sensor 40, the surface

> acoustic wave generated in the comb-shaped interdigitated electrode propagates, and after experiencing a roundtrip along the orbital band disposed in an inner spherical surface, a reflection wave of the propagated wave was observed again at the comb-shaped interdigitated electrode, as the output signal from the comb-shaped interdigitated electrode, as shown in Fig. 4 (c). In order to observe only a Rayleigh wave component (frequency of about 40MHz), frequency components higher than 50MHz are removed in Fig. 4 (c). In the figure, the time interval between the signal A and the signal B was measured as 11.5 microsecond, in particular, in a state when the liquid was not flowing in the liquid-pipe fitting.

Moreover, Applicants have identified typographical errors in the Japanese language version of the '688 patent, wherein Figure 4(b) and Figure 4(c) should be replaced by Figure 5(b) and Figure 5(b), respectively, as shown in the following:

> When a pulsed signal (200V) of a short time period as shown in **Fig. 5 (b)** is applied to the liquid-detection sensor 40, the surface acoustic wave generated in the comb-shaped interdigitated electrode propagates, and after experiencing a roundtrip along the orbital band disposed in an inner spherical surface, a reflection wave of the propagated wave was observed again at the comb-shaped interdigitated electrode, as the output signal from the comb-shaped interdigitated electrode, as shown in **Fig. 5 (c).** In order to observe only a Rayleigh wave component (frequency of about 40MHz), frequency components higher than 50MHz are removed in **Fig. 5 (c).**

However, Applicants respectfully submit that the '688 patent fails to disclose an electroacoustic transducer connected to an active switching unit disposed outside of the sensor head, wherein the active switching unit is actively controlled such that the active switching unit is configured to switch respective signal paths at desired switching timings between an external high frequency generator and an external detection/output unit so that the active switching unit is configured to transfer a high frequency electric signal from the external high frequency generator to the interdigital transducer, and the active switching unit is configured to switch the signal path from the interdigital transducer to the external detection/output unit, at a timing after the interdigital transducer has transmitted the surface

acoustic wave, but just before the surface acoustic wave returns from a predetermined number of a plurality of roundtrips, as recited in amended Claim 1.

In particular, Applicants note that Figure 5(a) in the '688 patent discloses a circulator 41, which is clearly distinguishable from the claimed active switching unit. As known to one of ordinary skill in the art, a circulator is a passive electronic component with three or more ports, and the ports can be accessed when a signal is fed into any port and is transferred to the next port only such that the first port is counted as following the last in numeric order, and cannot operate as a claimed active switching unit, which switches a signal path actively at a desired and a predetermined timing. As clearly shown in Figure 5(c), because the circulator of the '688 patent serves as a directional coupler, which merely separates the signals based on the direction of signal propagation at any timing, the surface acoustic wave is passively detected every time when the surface acoustic wave orbits along the circular orbital band, and cannot switch a signal path actively from the interdigital transducer to the external detection/output unit at a desired timing just before the surface acoustic wave returns from a predetermined number of a plurality of roundtrips, as recited in Claim 1.

Moreover, Applicants note that the Office Action in Claim 5 asserts that the '688 patent discloses that a switching unit is timing controlled "...in that the input and output of the fluid sensor is measured as a function of time (i.e., MHz) [0053]." However, Applicants note that "MHz" is defined in the frequency domain, whereas the claimed active switching unit operates in the time domain.

Thus, no matter how the teachings of the '787 and '688 patents are combined, the combination does not teach or suggest an interdigital electroacoustic transducer being connected to an active switching unit disposed outside the sensor head, wherein the active switching unit is actively controlled such that the active switching unit is configured to switch respective signal paths at desired switching timings between an external high frequency

generator and an external detection/output unit so that the active switching unit is configured to transfer a high frequency electric signal from the external high frequency generator to the interdigital transducer, as recited in amended Claim 1.

Further, the combined teachings of the '787 and '688 patents fail to disclose that the sensor head is actively controlled throughout the high frequency output signal, from which a delay time of the surface acoustic wave after the predetermined number of the plurality of roundtrips is calculated by the external detection/output unit, the delay time being generated by the change in the propagation characteristic, as recited in amended Claim 1.

Accordingly, for the reasons stated above, Applicants respectfully submit that the rejection of Claim 1 is rendered moot by the present amendment to that claim.

Regarding the rejection of dependent Claims 4-9 under 35 U.S.C. § 103(a), Applicants respectfully submit that the '500 and '692 patents fail to remedy the deficiencies of the '787 and '688 patents, as discussed above. Accordingly, Applicants respectfully submit that the rejections of dependent Claims 4-9 are rendered moot by the present amendment to Claim 1.

Claim 27 is directed to a sensor head, and includes limitations analogous to the limitations recited in amended Claim 1. Further, Applicants note that Claim 27 recites a receiving interdigital transducer arranged on the orbital band of the three-dimensional base body separated from the exciting electroacoustic transducer. Further, Claim 27 has been amended to clarify that the sensor head is configured to output the high frequency output signal, from which a delay time of the surface acoustic wave after the predetermined number of the plurality of roundtrips along the orbital band is calculated by an external detection/output unit, the delay time being generated by the change in the propagation characteristic, by detecting a transmitted surface acoustic wave through the receiving interdigital transducer, the transmitted surface acoustic wave being excited by the exciting

electroacoustic transducer. Accordingly, for the reasons stated above, Applicants respectfully submit that the rejection of Claim 27 is rendered moot by the present amendment to that claim.

Thus, it is respectfully submitted that independent Claims 1 and 27 (and all associated dependent claims) patentably define over any proper combination of the '787, '688, '500, and '692 patents.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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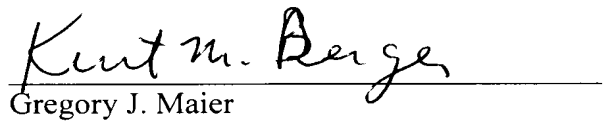

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